PATENT SPECIFICATION

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494031

PROVISIONAL SPECIFICATION

Improvements in Games Balls and their Manufacture

We, DUNLOP RUBBER COMPANY LIMITED, a British Company of 32, Osnaburgh Street, London, N.W.1, DOUGLAS FRANK TWISS, SAMUEL GRAHAM BALL and JOHN FRANCIS COOKSON, all British subjects of the aforesaid Company's Works at Fort Dunlop, Erdington, Birmingham, in the County of Warwick, do hereby declare the nature of this invention to be as follows:—

This invention concerns improvements in games balls and their manufacture and especially concerns improvements in the manufacture of golf balls.

Commonly such a ball consists of a cover of india rubber, gutta-percha, balata or the like or an admixture of these which is moulded on to a core, which core may have been wound with strips or threads, for example of rubber, to create a spherical or substantially spherical resilient nucleus.

The objects of the present invention include the provision of a ball at reduced cost in manufacture and offering an increased resistance to deterioration when subjected to climatic variations or soaking in water and with improved mechanical qualities such as durability against cutting or abrasion.

It has already been proposed to form covers of various substances such as nitro cellulose and fatty acids or fats, or to form them of cork with a casein binder or from gutta-percha or rubber reinforced with a colloidal material such as glue.

The use of viscose has also been proposed and gutta-percha with or without vegetable resins, viscose or proteins has been suggested.

According to this invention a games ball such as a golf ball is formed or consists wholly or partly of a water resistant synthetic plastic substance or substances which may incorporate natural or artificial rubber and/or gutta-percha and/or balata in suitable proportions.

The said substance or substances may be of any suitable type, but we find those classes of synthetic plastic substances to be most useful which are obtainable by polymerisation of substituted ethylene compounds.

Such compounds include polyvinyl acetate, polyvinyl chloride, polyvinyl cyanide, poly-styrene or polymerisation products of vinylethylene, or of substituted derivatives of any of the preceding such as vinylchlorethylene [illegible] vinyl cyanide.

Compositions containing one or more of these synthetic plastic substances may constitute one or more layers or coatings providing a shell or covering the ball or for the core of a golf ball.

Alternatively, the composition comprising such synthetic plastic materials may constitute the whole or the major part of the ball.

If the composition is to contain rubber, gutta-percha, or balata, mixing may be effected in any convenient manner, eg. by softening the constituents in a plasticised or powdered condition or by using all or any of the constituents in the form of cough or solution or emulsions or by a combination of such devices, any solvent and or non-solvent liquid being removed eventually.

Such compositions may be compounded in any desirable manner as for instance, to render them susceptible of being shaped and or vulcanised, the two processes in the former case occurring either concurrently or as successive operations.

Improvement in the qualities of games balls incorporating such compositions may be effected uniformly throughout the mass of the composition, or may be intensified at or adjacent to the surface of the external layer.

Local or uniform hardening, for example, may be effected by heat treatment with or without concurrent moulding and or vulcanisation, or by acid treatment of the surface with acids of the sulphonic group, especially sulphuric acid, or by other chemical agents such as formaldehyde.

Fillers such as wood flour may be incorporated in the composition to increase its toughness and suitable pigments such as titanium white to impart the desired colour and opacity.

Dated this 25th day of May, 1937.

W. BOND,
Acting for the Applicants.

[*Price* 1/-]

COMPLETE SPECIFICATION

Improvements in Games Balls and their Manufacture

We, DUNLOP RUBBER COMPANY LIMITED, a British Company of 32, Osnaburgh Street, London, N.W.1, DOUGLAS FRANK TWISS, SAMUEL GRAHAM BALL and JOHN FRANCIS COOKSON, all British Subjects and all of the aforesaid Company's Works at Fort Dunlop, Erdington, Birmingham, in the County of Warwick, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention concerns improvements in games balls and their manufacture and especially concerns improvements in the manufacture of golf balls, in its application to which the invention is more particularly described.

Commonly such a ball consists of a cover of india-rubber, gutta percha, or balata, or an admixture of these, which is moulded onto a core which core may be wound with strips or threads, for example of rubber, to create a spherical or substantially spherical resilient nucleus.

It has already been proposed to form covers of various substances such as nitrocellulose and fatty acids or fats, or to form them of cork with a casein binder or from gutta percha or rubber reinforced with a colloidal material such as glue.

The use of viscose has also been proposed and gutta percha with or without vegetable resins, viscose, or proteins has been suggested.

When gutta percha is used alone it is sometimes found to have insufficient resistance to change of temperature, more particularly to rise of temperature, whereas by the present invention we are able to impart the desired degree of heat resistance and to prevent deterioration in colour and/or other physical characteristics when subjected to climatic variations or to soaking in water, while imparting improved mechanical qualities such as durability against cutting or abrasion.

We are aware that it has already been proposed to form compositions suitable for golf ball covers from emulsions or dispersions comprising rubber, gutta percha, balata or similar vegetable resins occurring naturally or artificially obtained, and in vulcanised or unvulcanised condition, and that it has also been proposed to use as alternatives or admixtures, aqueous dispersions of coagulated rubber, vulcanised rubber, synthetic or artificial rubber, or rubber-like substances.

The resistance, however, to humid atmosphere, to immersion in water and to wet conditions generally, of golf balls produced from the above compositions is liable to be impaired by the inclusion of substances commonly employed as protective colloids for such aqueous dispersions or emulsions which colloids are generally hydrophilic substances with an affinity for water.

In contradistinction thereto golf ball covers when produced by the process as defined below possess to a marked degree the desired feature of resistance to water combined with the absence of any undesirable degree of plasticity at lowered temperatures.

According to this invention a process for the production of games balls comprises forming the outer portion at least, of said balls of a non-aqueous mixture of gutta percha and a water resistant synthetic thermoplastic substance comprising a polymerisation product of a member of the vinyl group or of a substitution derivative thereof.

By the term "gutta percha" throughout the specification and claims, we intend to include also balata.

The preferred kinds of synthetic thermoplastic substances employed are those products obtained by the polymerisation of chemical substances of the vinyl group that is, containing the grouping $CH_2:CH$ in which the free valency of the second carbon atom is satisfied by a halogen, carboxy-ester, or hydrocarbon radical, for example, vinyl benzene (styrene), vinyl acetate, vinyl-formic (acrylic) esters, vinyl chloride and vinyl cyanide, and halogen or alkyl derivatives of these, such as α vinyl α chlorethylene or α methylvinyl cyanide.

As shown in the accompanying examples, the cover of the ball is composed of a major proportion of gutta percha as for instance, in three parts by weight with which is incorporated a proportion as for instance, one part by weight of one or more of the above substances, and if desired the whole of the ball may be moulded therefrom.

The gutta percha and said substance or substances may be mixed together in any convenient manner, for example by milling together the constituents in a plasticized or powdered condition, or by using all or any of the constituents in the form of dough, or solution, in a non-aqueous solvent, any solvent being removed subsequently.

EXAMPLE 1.

Three mixtures of the following parts by weight as shown under "A", "B" and "C", are made on the mixing mills under similar conditions.

	"A"	"B"	"C"
Detesinated gutta percha	73.325	73.325	73.325
Polymerised chloro-vinyl-ethylene	—	22.05	—
Polymerised vinyl-ethylene	—	—	22.05
Pale crepe rubber	22.05	—	—
Titanium dioxide	4.5	4.5	4.5
Magnesium oxide	—	1.10	—
Zinc oxide	—	2.205	—
Sulphur	0.125	0.125	0.125

From each of these mixtures are formed by a preliminary moulding operation pairs of hemispherical shells which are applied to prepared golf ball cores to which they are moulded in the usual manner, the heating required being 15 minutes at 175° F. The balls so formed when tested by an apparatus for the measurement of the degree of cutting equivalent to a "topped" blow showed a greater resistance to cutting on the part of composition "C" than either of the other two, and a greater resistance by composition "B" than composition "A".

EXAMPLE 2.

Three compositions "D", "E", "F", composed of parts by weight as shown in the accompanying table are prepared on the mixing mills under similar conditions. On testing the relative resistance of these mixtures to rise of temperature, their relative behaviour is indicated below by the "softening temperature" at which each attained a standard degree of advanced softening. The form of the apparatus used being that described in the Journal of the Society of Chemical Industry, 1919, page 105 T.

	"D"	"E"	"F"
Gutta percha	100	80	73.325
Polymerised chloro-vinyl-ethylene	—	—	22.05
Polyvinyl acetate	—	20	—
Titanium dioxide	—	—	4.5
Magnesium oxide	—	—	2.205
Zinc oxide	—	—	2.205
Sulphur	—	—	0.125
Softening temperature	95° C.	115° C.	175° C.

It will be seen from the above that the composition marked "F" which is substantially the same as that designated "B" in Example 1, and also composition "E", offer a greater resistance to softening than the composition designated "D".

The qualities of balls incorporating such compositions may be intensified at or adjacent to the surface of the external layer as for example by effecting local or uniform hardening by heat treatment with or without concurrent moulding and/or vulcanisation, or by treatment of the surface with acids of the sulphonic group, especially sulphuric acid, or by other chemical agents such as chlorine or formaldehyde.

Fibrous or other fillers such as wood flour may be incorporated in the composition to increase its toughness and suitable pigments such as titanium white to impart the desired colour and opacity.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A process for the production of games balls comprising forming the outer portion at least, of said balls of a non-aqueous mixture of gutta percha and a water resistant synthetic thermoplastic substance comprising a polymerisation product of a member of the vinyl group or of a substitution derivative thereof.

2. A process according to the preceding claim wherein said substance is incorporated with said gutta percha in the form of polyvinyl acetate.

3. A process according to Claim 1 wherein said substance is incorporated with said gutta percha in the form of polyvinyl chloride.

4. A process according to Claim 1 wherein said substance is incorporated with said gutta percha in the form of polyvinyl cyanide.

5. A process according to Claim 1 wherein said substance is incorporated with said gutta percha in the form of polystyrene.

6. A process according to Claim 1 wherein said substitution derivative is incorporated with said gutta percha in the form of a polymerised vinylchlorethylene.

7. A process according to Claim 1 wherein said substitution derivative is incorporated with said gutta percha in the form of a polymerised methylvinyl cyanide.

8. A process according to any one of Claims 1 to 7 wherein said substance or substitution product is incorporated with said gutta percha in the proportion substantially of one part to three by weight.

9. A process for the production of golf and other balls for games as claimed in any of the preceding claims substantially as described with reference to the accompanying examples.

10. Golf and other balls for games having covers when prepared in accordance with any of the preceding claims.

Dated the 21st day of March, 1938.
W. BOND,
Acting for the Applicants.

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